PONOMAREV, A. I.; KLEBANSKIY, A. L.; LARIONOVA, Yu. A.; BOGDANOVA, V. V.

Preparation of p-cyanophenylmethyldiethoxysilane. Zhur. ob. khim. 33 no.1:316 '63. (MIRA 16:1)

(Silane)

LARIONOVA, Z. P.

"Qualitative Changes in the Plasma Protein of Living Subjects During Various Forms of Goiter in Relation to Therapy." Cand Med Sci, Kirgiz State Medical Inst, Frunze, 1954. (KL, No 13, Mar 55)

SO: Sum. No. 670, 29 Sep 55--Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (15)

TKACHENKO, N.O.; LARIONOVA, Z.K.; MERKULOVA, Z.N.; GORDIYCHUK, M.I.
[Hordiichuk, M.I.]

Deresination of felt cones. Leh. prom. no.2: 29-30 Ap-Je '64.
(MIRA 17:7)

LARIONOVA, Z.M., kand. tekhn. nauk.

Properties of concretes with a mixed gypsum base. Trudy NIIZHB no.1: 72-89 '57. (MIRA 11:1)

(Concrete)

LARIONOVA, Z.M., kand.tekhn.nauk; TARASOVA, A.P., kand.tekhn.nauk

Microscopic and thermographic testing of heat-resistant concretes made with water-glass. Trudy NIIZHB no.7:238-254 '59. (MIRA 12:11)
(Concrete--Testing)

SALMANOV, G.D., kand.tekhn.nauk; LARIONOVA, Z.M., kand.tekhn.nauk

Microscopic testing of the combination of portland-cement-base concretes with fine ground magnesite and chromite. Trudy NIIZHB no.7:255-260 '59. (MIRA 12:11)

(Concrete--Testing)

SIVERTSEV, G.N.; LARIONOVA, Z.M.

Effect of calcium sulfate on the hydration of cements. Trudy NIIZHB no.10:4-56 '59. (MIRA 13:3)
(Cement) (Calcium sulfate)

LARIONOVA, Z.M.

Studying the structure of test pieces several years old made of mixed hydraulic gypsum. Trudy NIIZHB no.10:94-104 '59. (MIRA 13:3)

(Gypsum)

LARIONOVA, Z.M.

Using the petrographic analysis in studying the structure of concretes. Trudy NIIZHB no.10:128-146 '59. (MIRA 13:3)
(Concrete)

LARIONOVA, [illegible], kand.tekhn.nauk; GRAMBERG, G.I., inzh.

Some studies of [illegible] during the hydration of cements.
Trudy NIIZHB no.[illegible] [illegible] (MIRA 14:10)
(Cement)
(Hydration)

LARIONOVA, [illegible], kand.tekhn.nauk; NEKRITINA, L.V., inzh.; GRECHISHCHEVA, S.I., inzh.

Properties of calcium hydrosulfoaluminate. Trudy KIIZHB no.18:78-91 '60. (MIRA 14:10)
(Calcium aluminates)

MIRONOV, A., doktor tekhn. nauk, prof.; LARIONOVA, Z.M., kand. tekhn. nauk; TSITELAURI, G.I., inzh.; KOKETKINA, A.I., inzh.

Electric curing of light concrete with a slag binding material. Stroi. mat. 10 no.1:31-33 Ja'64. (MIRA 17:5)

LIPKOVICH, Z.; ESTRIN, G.; MIROSHNICHENKO, D.; TRUBITSYN, N.;
STRELKOV, I., master; LARIONTSEV, A.; ROMANOVICH, K.

Experience of innovators and efficiency promoters. Stroitel' 8 no.10:25-26 O '62. (MIRA 15:11)

1. Predsedatel' komiteta professional'nogo soyuza rabochikh stroitel'stva i promyshlennosti stroitel'nykh materialov stroitel'nogo uchastka No.108 tresta Mosstroy No.18 (for Lipkovich).
(Building—Technological innovations)

LARIONTSEV, A.I. (Kramatorsk)

Mechanized feeding of pipe into the pipe cutting machine.
Vod.i san.tekh. no.2:36 F '60. (MIRA 13:5)
(Pipe cutting)

LARIONTSEV, Ye.G.; SHAFRANOV, V.D.

Deceleration by radiation damping of a charge moving in a plasma situated in a magnetic field. Izv. vys. ucheb. zav.; radiofiz. 6 no.4:850-852 '63. (MIRA 16:12)

L 58293-65 EWT(l)/EWP(m)/EPF(n)-2/EWG(m)/EWA(d)/EPA(w)-2 Pz-6/Po-4/Pd-1/
Pab-10/Pi-4/Pu-4 LIP(c) WW/AT

ACCESSION NR: AP5019480 UR/0040/64/028/005/0962/0964 63
B

AUTHOR: Lariontsev, Ye. G. (Moscow)

TITLE: Certain problems of hydrodynamic and hydromagnetic stability in a cylindrical jet

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 5, 1964, 962-964

TOPIC TAGS: hydrodynamics, plasma dynamics, plasma jet

ABSTRACT: The stability of a cylindrical tangential discontinuity with surface tension in a plasma jet subject to arbitrary perturbations is discussed. It is shown that the stability criteria for an ideally conducting plasma jet in a non-conducting fluid are strongly effected by the distribution of current density over a cross section of the jet. "In closing, the author expresses his thanks to A. I. Morozov for proposing and reviewing the work." Orig. art. has: 9 formulas.

ASSOCIATION: none
SUBMITTED: 17Oct63 ENCL: 00 SUB CODE: ME
NR REF SOV: 004 OTHER: 000 JPRS

dm
Card 1/1

L 1642-66 EWT(1)/ETC/EWG(m)/EPF(n)-2/EPA(w)-2 IJP(c) AT

ACCESSION NR: AP5014848 UR/0020/65/162/003/0536/0538

AUTHOR: Lariontsev, Ye. G. 44,55 44/B 21,44,55

TITLE: Stabilization of certain instabilities when a plasma moves transversely to a magnetic field

SOURCE: AN SSSR. Doklady, v. 162, no. 3, 1965, 536-538

TOPIC TAGS: plasma stability, plasma pinch, plasma magnetic field, flute instability

ABSTRACT: It is shown that the boundary of the plasma moving with a velocity that varies with the depth is more stable than the boundary of a plasma at rest. Several types of instability are analyzed and remedies for their elimination are discussed. In the case of flute instability, it is shown that the inhomogeneity of the plasma flow velocity exerts a stabilizing influence on such an instability, and a mathematical formula is derived for the stability condition. In particular, if the magnetic fields inside and outside the plasma are parallel, then maximum stability is attained when the plasma moves

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L 1642-66

ACCESSION NR: AP5014848

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transverse to the magnetic field. The stabilization of sausage instability in the case of a cylindrical jet with longitudinal velocity is also investigated and it is shown that a current-carrying cylindrical jet is more stable than a corresponding cylinder at rest. The long-wave disturbances are easiest to stabilize in this case. Analogous results are obtained in the investigation of the stability of a hydrodynamic jet with surface tension. High stability was also observed in the case of current-carrying pinches in accelerated plasma jets, where again the stabilization was due to the inhomogeneity in the jet velocity. Mathematical expressions for the stabilization are derived for all cases. This report was presented by M. A. Leontovich. Orig. art. has: 12 formulas

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University) 44,55

SUBMITTED: 19Sep64 ENCL: 00 SUB CODE: ME

NR REF SOV: 002 OTHER: 002

Card 2/2 DP

L 01824-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JW/JG

ACC NR: AP6030954 SOURCE CODE: UR/0181/66/008/009/2572/2578

60
C

AUTHOR: Kask, N. Ye.; Korniyenko, L. S.; Lariontsev, Ye. G.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Investigation of the interaction between the nearest Nd^{3+} in CaF_2 ions

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2572-2578

TOPIC TAGS: ion interaction, ionization spectrum, magnetic dipole, paramagnetic ion, magnetic field, neodymium ion, calcium fluorite

ABSTRACT: Angular relationships of a paired rhombic spectrum of Nd^{3+} ions in CaF_2 have been experimentally investigated and semiempirically described by the following two parameters: $A + C = 0.171\ cm^{-1}$ and $B = -0.024\ cm^{-1}$. The contribution of magnetic dipole interaction of the Nd^{3+} ions in the A + C and B parameters is calculated. It is shown that the nondipole interaction predominates over the dipole interaction and that there is a boost to the energy of interaction of the paramagnetic ions, depending on the value of the outer magnetic field. Orig. art. has: 4 figures, 10 formulas, and 1 table. [Based on authors' abstract] [NT]

SUB CODE: 20/ SUBM DATE: 08Jan66/ ORIG REF: 001/ OTH REF: 001/

Card 1/1

LARIOSHCHENKO, T.G., starshyy nauchnyy sotrudnik

Role of general irradiation in the treatment of metastatic cancer of the breast. Vest. rent. i rad. no.4:43-49 Jl-Ag '54. (MLRA 7:10)

1. Iz Gosudarstvennogo onkologicheskogo instituta imeni P.A. Gertsena (i.o. direktora kandidat meditsinskikh nauk V.V.Gorodilova)

(RADIOTHERAPY, in various diseases,
cancer, metastases from breast)
(BREAST, neoplasms,
ther., x-ray, metastases to various organs)

LARIOSHCHENKO, T.G. (Moskva, A-8, 1-y Dmitrovskiy proyezd, d.4/1A, kv.50)

Result of using a lead grid in roentgenotherapy of radio-resistant tumors [with summary in English] Vop.onk. 2 no.4:457-463 '56.
(MLRA 9:12)

1. Iz Gosudarstvennogo onkologicheskogo instituta imeni P.A.Gertsena (dir. - prof. A.N.Novikov, nauchn. rukov. - chlen-korrespondent AMN SSSR prof. A.I.Savitskiy)

(RADIOTHERAPY, in various diseases,
cancer, grid technic in resist. forms (Rus))
(NEOPLASMS, therapy,
x-ray, grid technic in resist. forms (Rus))

LARIOSHCHENKO, T.G. (Moskva, A-8, 1-y Dmitrovskiy proyezd, d.4/1-A, kv.50)

1. Role of radiation and hormone therapy in the compound treatment of mammary cancer and its metastases [with summary in English]. Vop.onk. 3 no.2:214-220 '57. (MLRA 10:6)

1. Iz Gosudarstvennogo onkologicheskogo instituta im. P.A.Gertsena (dir. - prof. A.N.Novikov; nauchn. rukovod. - chl.-korr. Akademii meditsinskikh nauk SSSR prof. A.I.Savitskiy)

(BREAST NEOPLASMS, surg.
postop. combined hormone & radiother., statist. (Rus))
(HORMONES, ther. use
postop., in breast cancer, with radiother., statist. (Rus))
(RADIOTHERAPY, in various dis.
cancer of breast, postop. irradiation with hormones, statist. (Rus))

LARIONSHCHENKO, Taisiya Gavrilovna (State Oncological Institute im. Gertsen, Min Health RSFSR), for Doctor of Medical Sciences on the basis of the dissertation defended 22 Sept. 1959 in the Council of the Central Institute for Advanced Training of Physicians, entitled: "Radiation Therapy of Cancer of the Mammary Gland".

(BMVISSO USSR, 2-61, 19/20)

KL 25, 1959 p. 138

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19/20

LARIOSHCHENKO, T.G. (Moskva, A-8, 1-y Dmitrovskiy proyezd, d.4 kv.50)

Radiotherapy of brest cancer. Vop.onk. 5 no.11:529-535 '59.
(MIRA 14:7)

1. Iz Gosudarstvennogo onkologicheskogo instituta imeni P.A.Gertsena (dir. - prof. A.N.Novikov, nauchnyy rukovoditel' - chlen-korrespondent AMN SSSR zasluzhennyy deyatel' nauki prof. A.I.Savitskiy), Moskva.
(BREAST--CANCER) (RADIOTHERAPY)

LARIOSHCHENKO, T.G.

Roentgen therapy of metastases of cancer of the breast into the osseous system. Vop.onk. 6 no.1:94-98 '60.

(MIRA 13:10)

(BREAST—CANCER) (BONES—CANCER)

LARIOSHCHENKO, T.G.; YANISHEVSKIY, V.I.; NEMYRYA, A.N.

Experience in the treatment of cancer of the breast from data of the Gertsen Oncological Institute. Khirurgiia 36 no.8:11-20 Ag '60. (MIRA 13:11)

1. Iz Gosudarstvennogo onkologicheskogo instituta imeni P.A. Gertsena (dir. - prof. A.N. Novikov; nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR zasluzhennyy deyatel' nauki prof. A.I. Savitskiy).
(BREAST--CANCER)

LARIOSHCHENKO, Taisiya Gavrilovna; BLISEYEVA, A.V., red.; KUZ'MINA, N.S., tekhn. red.

[Radiation treatment of cancer of the breast] Luchevoe lechenie raka molochnoi zhelezy. Moskva, Medgiz, 1961. 161 p. (MIRA 15:7)

(BREAST--CANCER) (X RAYS--THERAPEUTIC USE)

LARIOSHCHENKO, T.G.; SHCHELKOVA, T.D.

Method for combined therapy of malignant melanomas. Med.rad. no.11:6-10 '61. (MIRA 14:11)

1. Iz rentgenoterapevticheskogo otdeleniya Gosudarstvennogo onkologicheskogo instituta imeni P.A. Gertsena.
(MELANOMA)

LARIOSHCHENKO, T.G.; ALEKSEYEVA, S.I.

Reactions and complications under varying methods of radiotherapy for laryngeal cancer. Med.rad. 7 no.6:55-58 Je '62. (MIRA 15:8)

1. Iz Gosudarstvennogo nauchno-issledovatel'skogo onkologicheskogo instituta imeni P.A. Gertsena.
(LARYNX--CANCER) (RADIOTHERAPY)

LARIOSHCHENKO, T.G., doktor meditsinskikh nauk

Radiotherapy of cancer of the breast. Med.sestra 21 no.7:12-16 Jl '62. (MIRA 15:8)

1. Iz Gosudarstvennogo nauchno-issledovatel'skogo onkologicheskogo instituta imeni P.A.Gertsena, Moskva.
(BREAST--CANCER) (RADIOTHERAPY)

LARIOSHCHENKO, T.G.; ALEKSEYEVA, S.I.

Reactions and complications under varying methods of radiotherapy for laryngeal cancer. Med.rad. 7 no.6:55-58 Je '62. (MIRA 15:8)

1. Iz Gosudarstvennogo nauchno-issledovatel'skogo onkologicheskogo instituta imeni P.A. Gertsena.
(LARYNX--CANCER) (RADIOTHERAPY)

LARIOSHCHENKO, T.G.

Prolonged remissions of lymphogranulomatosis in X-ray therapy with a grid. Med. rad. 10 no.11:15-19 N '65.
(MIRA 19:1)

1. Gosudarstvennyy onkologicheskiy institut imeni P.A. Gertsena (direktor - prof. A.N. Novikov). Submitted October 17, 1964.

LARIOSHCHENKO, T.G.; CHAYKOV, I.M.; NEMYRYA, A.N.

Results of the treatment of breast cancer. Khirurgiia 41 no.4: 32-36 Ap '65. (MIRA 18:5)

1. Onkologicheskiy institut imeni Gertsena (dir. - prof. A.N. Novikov), Moskva.

LARIOSHIN, F.N., inzhener.

Layer plowing as a measure against the regrowth of alfalfa. Mekh. i elek.sel'khoz. no.4:14-17 Ap '53. (MLRA 6:5)

1. Kirgizskiy sel'skokhozyaystvennyy institut imeni K.I. Skryabina. (Plowing) (Alfalfa)

LARISCH, E.; PATRAULEA, N.:

Theory of vine contours with permeable flaps. p. 689. COMUNICARILE. Bucuresti. Vol. 5, No. 4, April 1955.

SOURCE: East European Accessions List (EEAL) LC, Vol. 5, No. 2, Feb. 1956.

LARISCH, E.; PATRAULEA, N.

The track movement around a permeable bearing plate.
p. 1109.
Academia Republicii Populare Romine. COMUNICAILE.
Bucuresti.
Vol. 5, no. 7, July 1955.

SOURCE: East European Accessions List (EEAL) Library of Congress,
Vol. 5 No. 12, December 1956

LARISCH E.

C-5

RUMANIA/Nuclear Physics - Nuclear Reactions

Abs Jour : Ref Zhur - Fizika, No 3, 1958, No 5537

Author : Shechtman I., Larisch E.
Inst : Not Given
Title : On the Possibility of Applying Thermonuclear Reactions to Rocket Propulsion

Orig Pub : Publ. Acad. RPR Inst. fiz. atom., 1956, N ET 26. 21pp., ill.

Abstract : See Referat Zhur Fizika, 1957, No 7, 16737

Card : 1/1

LARISCH, E.

PROPAGAREA ARDERII IN CANALE CU SECTIUNE VARIABILĂ. E. Larisch. Stud. Cerc. Mec. Aplic., Oct.-Dec., 1955, pp. 863-873. In Rumanian. Derivation of an integral equation describing the laminar flow propagation in divergent channels. The procedure is the same as that given by Taion for the channel profiles with parallel walls. By solving this equation, formulas are obtained for the channel profiles in which flame propagation generates a definite flow. A method is then indicated, furnishing the solution of the direct problem for a channel whose walls are polygonal. The present theory can be used for calculating the burned phenomenon in ram-jets.

RHA 9/11

LARISCH, E,

Regarding the utilization of thermonuclear energy for rocket propulsion.

p. 291 (Academia Republicii Populare Romine. Institutul de Fizica. Studii Si Cercetari De Fizica. Vol. 7, [illegible]. 2, Apr./June 1956. Bucuresti, Rumania)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2, February 1958

LARISCH, E.

Distr: 4E3c/4E3d

Possibility of nuclear chain reactions in light elements. E. Larisch and J. Shechtman. *Acad. rep. populare Romîne, Inst. fiz. atomică si Inst. fiz., Studii cercetări Fiz.* 7, 531–40 (1956).—A nuclear chain reaction can be self-sustained in a medium composed of 2 light elements, if only 1 reaction takes place, with 2 reaction products, one of which must be a neutron. Any other charged particle in electromagnetic interaction with other particles will decelerate continuously and transmit a very small portion of its energy only, but neutrons, which decelerate with short-range collisions, may transmit a great part of their energy to 1 particle in a medium composed of light nuclei. An equation is derived for the current of the particles of the medium along the energy axis, and then a general equation is derived for the steady state of the system in the presence of external sources of neutrons, which is a linear integral equation. The system becomes crit. when the corresponding homogeneous equation has an eigenvalue of 1. This general formula is applied then to the special case where the medium is D and T in equal at. concn. By introducing some simplifications and assuming the existence of a discrete spectrum, the highest eigenvalue is found to be 1.25×10^{-1}. Curves are presented for the neutron production d., when external sources are present emitting neutrons at 2, 14, and 40 m.e.v. It is concluded that a steady state can never be maintained in such a system, if the external sources are absent. W. Jacobson

LARISCH, E.

Blown wings of infinite range.

p. 599 (Academia Republicii Populare Romine. Institutul de Mecanica Aplicata. Studii Si Cercetari De Mecanica Aplicata. Vol. 7, no. 3, July/Sept. 195 . Bucuresti, Romania)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2, February 1958

Larisch E

RUMANIA/Nuclear Physics - Nuclear Reaction C-5

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 536

Author : Larisch, E., Shechtman, I.
Inst : [illegible]
Title : Possibility of Chain Reactions with Light Elements.

Orig Pub : Studii si cercetari fiz., 1957, 7, No 4, 531-540

Abstract : The authors discuss the possibility of self-maintaining nuclear reactions, one of the parts of which would be a neutron, in a medium consisting of two light elements. A general linear integral equation is derived for the particle current for the stationary case in the presence of external sources of neutrons. This formula is then applied, with certain simplifications, to a medium consisting of deuterium and tritium. Curves are given for the generation of neutrons for the cases when the external sources introduce these neutrons with energies of 2, 14, and 40 Mev. The authors reached the conclusion that it is

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Card 2/2

LARISH, E.

AUTHOR LARISH E., SHEKHTMAN I. PA - 3049

TITLE On the Introduction of Radiation into the Problems of Gas Dynamics.

PERIODICAL Doklady Akademii Nauk SSR 1957, Vol 113, Nr 5, pp 1010-1012 (USSR)

Received: 6/1957 Reviewed: 7/1957

ABSTRACT The author shows that failing to take the influence exercised by radiation into account often leads to considerable inaccuracies. The present paper discusses avery simple method by means of which it is possible to take the influence of radiation into account without any changes in the equation of adiabatic motion being necessary. It is known that radiation in the case of thermodynamic equilibrium may be treated as a perfect gas with the adiabatic index $\varkappa = 4/3$. The thermodynamic equations of a perfect gas with a radiation with which it is in equilibrium are explicitly written down. Equations are considerably simplified in the following two cases:

1) $\varkappa = 4/3$
2) if radiation pressure can be approximated by the formula

$$p_r = (\varkappa - 1)\, \bar{a}\, T^{\varkappa/(\varkappa-1)}$$

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i.e. if the adiabatic indices of the gas and the radiation are equal. In the cases 1) and 2) the equations of adiabatic motion and the corresponding boundary conditions do not change if radiation is taken into account. Thus, the solutions for p, ρ and v (velocity) have the same form as in the case if radiation is disregarded. Differences, however, exist with respect to temperature values. With $\gamma = 4/3$ radiation exercises no influence at all upon mechanical parameters, so that it is even possible to obtain a rather good approximated solution in the case of $\gamma \neq 4/3$.

The authors then extend these general ideas to the case of a vehement explosion. Because of the high temperatures occurring on such an occasion the light pressure in the initial stage of the propagation of the shock wave must play an important part. The solutions for p, ρ and v found by L.I. SEDOV remain valid also in the case of existing radiation. Finally, temperature distribution is determined. Temperature distribution is characterized by an additional constant R^4/a and is automodellike.

CARD 2/3

PA - 3049

On the Introduction of Radiation into the Problems of Gas Dynamics.

(with 2 illustrations)

ASSOCIATION: Institute for Applied Mathematics and Institute for Nuclear Physics of the Academy of the Roumanian People's Republic, Bucarest.
PRESENTED BY: L.I. SEDOV, Member of the Academy.
SUBMITTED: 12.12. 1956.

CARD 3/3

21(9)

AUTHOR: Larish, E. [redacted] SOV/89-5-6-9/25

TITLE: On a Possibility of a Non-Steady Thermonuclear Reactor (Ob odnoy vozmozhnosti nestatsionarnogo termoyadernogo reaktora)

PERIODICAL: Atomnaya energiya, 1958, Vol 5, Nr 6, pp 646 - 647 (USSR)

ABSTRACT: The energy produced in a steady gas discharge can be transferred only in the shape of heat. It is therefore of interest to investigate non-steady models in which part of the nuclear energy produced in the plasma is tranformed direct into electric energy.
The suggested model consists of a straight cylindrical or toroidal plasma column upon which, under the influence of an external axial magnetic alternating field, a radial oscillation is forced. The plasma here reaches a temperature T_e at which the energy liberated by nuclear reaction is compensated by radiation. The bases of the conditions necessary for periodical oscillations are derived theoretically and it is shown that at these conditions the energy liberated per cycle considerably surpasses the radiation energy. The surplus energy passes into the external windings which generate the

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magnetic field.
The temperature T_e for a thermonuclear reactor with a deuterium plasma amounts to about 10^8 °K, so that the velocity of sound in the plasma will be $\sim 10^8$ cm/sec. Herefrom there follows an eigenfrequency of a plasma column with ~ 10 cm diameter of $\sim 10^7$ cycles. By basing on the assumption that the frequency of the external magnetic alternating field is $\sim 10^2$ cycles and that the magnetic field in the interior of the plasma differs only little from the external magnetic field, the energy equation for the plasma column is derived, and, after introducing a number of further conditions and simplifications, it is possible to calculate the surplus energy produced per cycle.
It is found that the operation of the plasma with respect to the magnetic field is, on the average, positive and that, therefore, the energy is transferred from the plasma to the electric conductor.

On a Possibility of a Non-Steady Thermonuclear Reactor SOV/89-5-6-9/25

ASSOCIATION: Institut prikladnoy mekhaniki, Bukharest (Institute of Applied Mechanics, Bucharest)

SUBMITTED: June 2, 1958

Card 3/3

AUTHORS: Larish, E., Shekhtman, I. SOV/56-35-1-27/59

TITLE: The Propagation of Detonation Waves in the Presence of a Magnetic Field (Rasprostraneniye detonatsionnykh voln pri nalichii magnitnogo polya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 35, Nr 1, pp. 203-207 (USSR)

ABSTRACT: For the investigation of the propagation of shock waves in a plasma located in a magnetic field relativistic hydrodynamical equations have already been used by several authors (e.g. Ref 1). In the present paper so-called "perpendicular" detonation waves are investigated, viz. such as are propagated in a direction which is transversal to that of the magnetic field. Although it would not be necessary to take relativistic effects into account for such fields and thermonuclear fuels as can be produced today, it is nevertheless interesting to investigate the development of the modification of relativistic quantities and their boundary values (for stronger fuels and fields). It was found in the course of calculations that the properties of relativistic detonation waves are similar to those of ordinary waves. Solutions of the

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derived system of equations are given in the discontinuity both for the relativistic and for the non-relativistic case There are 7 figures and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut prikladnoy mekhaniki Akademii nauk Rumynskoy narodnoy respubliki (Institute for Applied Mechanics, AS Rumanian People's Republic) Institut atomnoy fiziki Akademii nauk Rumynskoy narodnoy respubliki (Institute of Nuclear Physics, AS Rumanian People's Republic)

SUBMITTED: February 13, 1958

24 (3)

AUTHORS: Larish, E., Shekhtman, I. SOV/56-35-2-34/60

TITLE: The Generation of Two Temperatures in an Ionized Gas Which is Placed in a Magnetic Field (Obrazovaniye dvukh temperatur v nakhodyashchemsya v magnitnom pole ionizovannom gaze)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2 (8), pp 514-515 (USSR)

ABSTRACT: The authors investigate an ionized gas the ionic temperature of which may be considered as given. A formula is given for the energy of cyclotron radiation. Cyclotron radiation has the frequency $\nu \sim eH/m_e$ and the gas is assumed to be transparent in this frequency interval. This is rather a rigorous condition and a sufficiently high rarefaction of the gas or high values of the magnetic field strength or of the ionic temperature is necessary. If the electrons can radiate a noticeable part of their energy, electron temperature will be differ considerably from ionic temperature. A formula is given for the relaxation time of the electron component. The electron gas is assumed to have

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The Generation of Two Temperatures in an Ionized Gas Which is Placed in a Magnetic Field

SOV/56-35-2-34/60

a Maxwell (Maksvell) distribution. The energy exchange between the electron gas and the ionic gas may be calculated according to a formula by Spitzer (Shpitser) (Ref 1). Finally, an expression is derived for the ratio $T_e/T_i = \theta$ of the electron and ionic temperatures. The difference between these 2 temperatures can be rather high. There are 1 figure and 1 reference, 0 of which is Soviet.

ASSOCIATION: Institut prikladnoy mekhaniki, Bukharest (Institute of Applied Mechanics, Bucharest)
Institut atomnoy fiziki, Bukharest-Magurele (Institute of Atomic Physics, Bucharest-Magurele)

SUBMITTED: April 12, 1958

Card 2/2

S/179/60/000/03/017/039
E081/E441

AUTHOR: Larish, E. (Bukharest)

TITLE: Aerodynamic Interaction with Free Molecular Flow

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, Nr 3, pp 117-120 (USSR)

ABSTRACT: The free molecular flow around bodies of any shape (not only convex) is considered, assuming that the size of the system is less than the mean free path of the molecules. It is shown that the problem leads to the solution of the linear integral equation (2.3). This equation is of the same form as the one describing the illumination in a space with non-absorbing walls which reflect according to Lambert's law, and on the basis of this analogy, the solution of Eq (2.3) can be simulated optically. The direct solution of Eq (2.3) is a very complex problem but as a special example the solution is obtained for the problem of multiple reflections in a hollow spherical cavity (Eq (4.5) and (4.6)). There are 2 figures and 1 English reference.

Card 1/2

S/179/60/000/03/017/039
E081/E441

Aerodynamic Interaction with Free Molecular Flow

ASSOCIATION: Institut prikladnoy mekhaniki, Akademii nauk Rumynskoy Narodnoy Respubliki
(Institute of Applied Mechanics, Academy of Sciences, Rumanian Peoples Republic)

SUBMITTED: November 20, 1959

VC

Card 2/2

S/179/61/000/002/005/017
E081/E141

AUTHOR: Larish, E. (Bucharest)

TITLE: Equations of free-molecular flow

PERIODICAL: Izvestiya Akademii nauk SSSR,Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1961, No.2, pp. 70-77

TEXT: The paper is a continuation of previous work of the present author (this journal, No.3, 1960; Ref.1). The equations describing the steady and unsteady flow of a rarefied gas are derived, taking into account repeated reflections of the gas particles from the surface of the body in the gas stream. A method of determining the reflection characteristics of fine-grained surfaces is suggested and illustrated by considering a surface with spherical and cylindrical depressions. The important special case is considered of a law of reflection represented by a combination of diffuse and specular reflection. If the motion consists of steady flow with a small unsteady flow superimposed on it, the unsteady state problem is simplified. The flow around a body is also investigated when the current consists of small

Card 1/2

S/179/61/000/002/005/017
E081/E141

Equations of free-molecular flow.

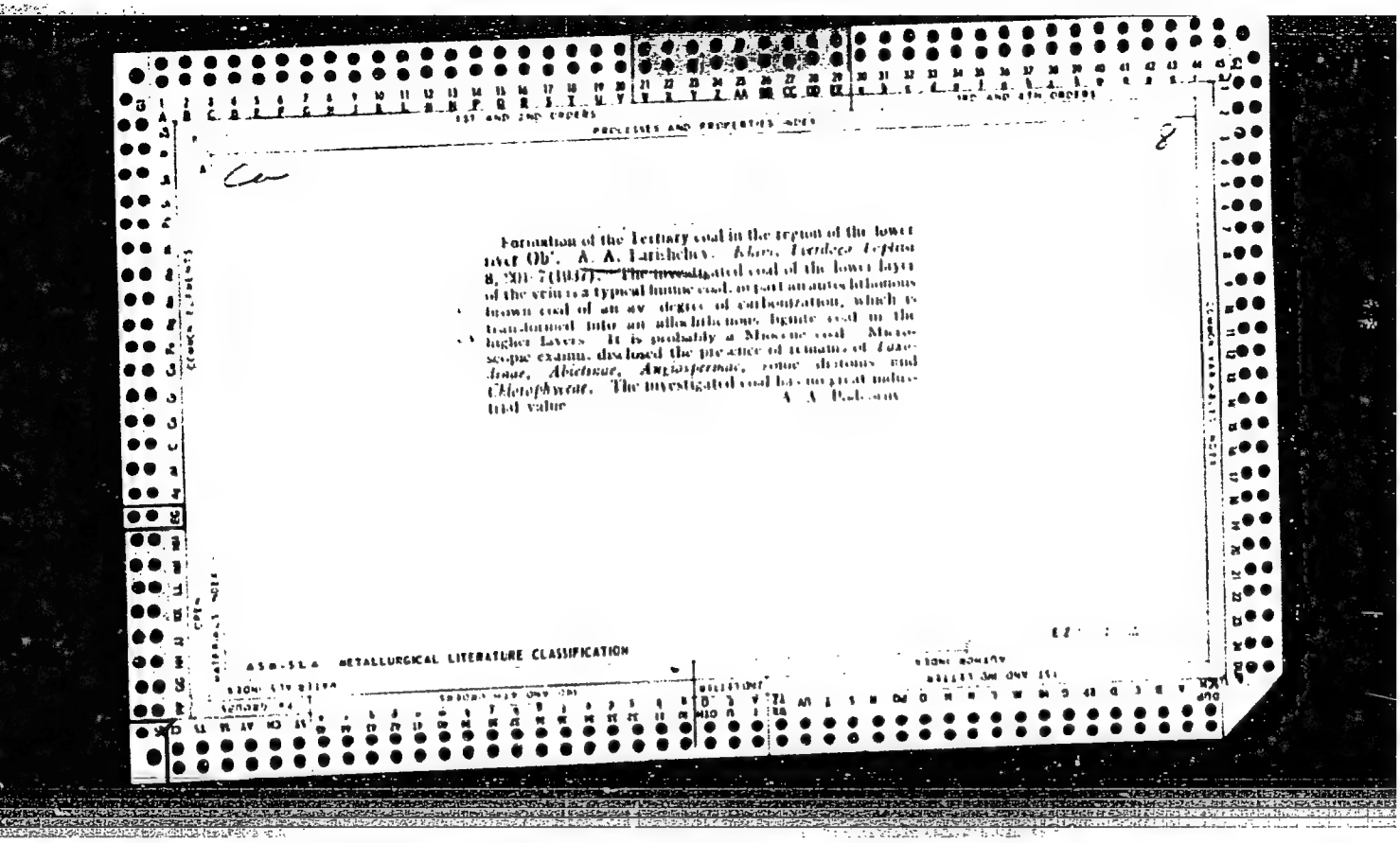
harmonic vibrations around a mean value.
There are 2 figures and 3 references: 2 Soviet and 1 English.
The English language reference reads as follows:
Ref.2: G.N. Patterson. Molecular flow of gases. N.Y. - London, 1956.

SUBMITTED: September 22, 1960

Card 2/2

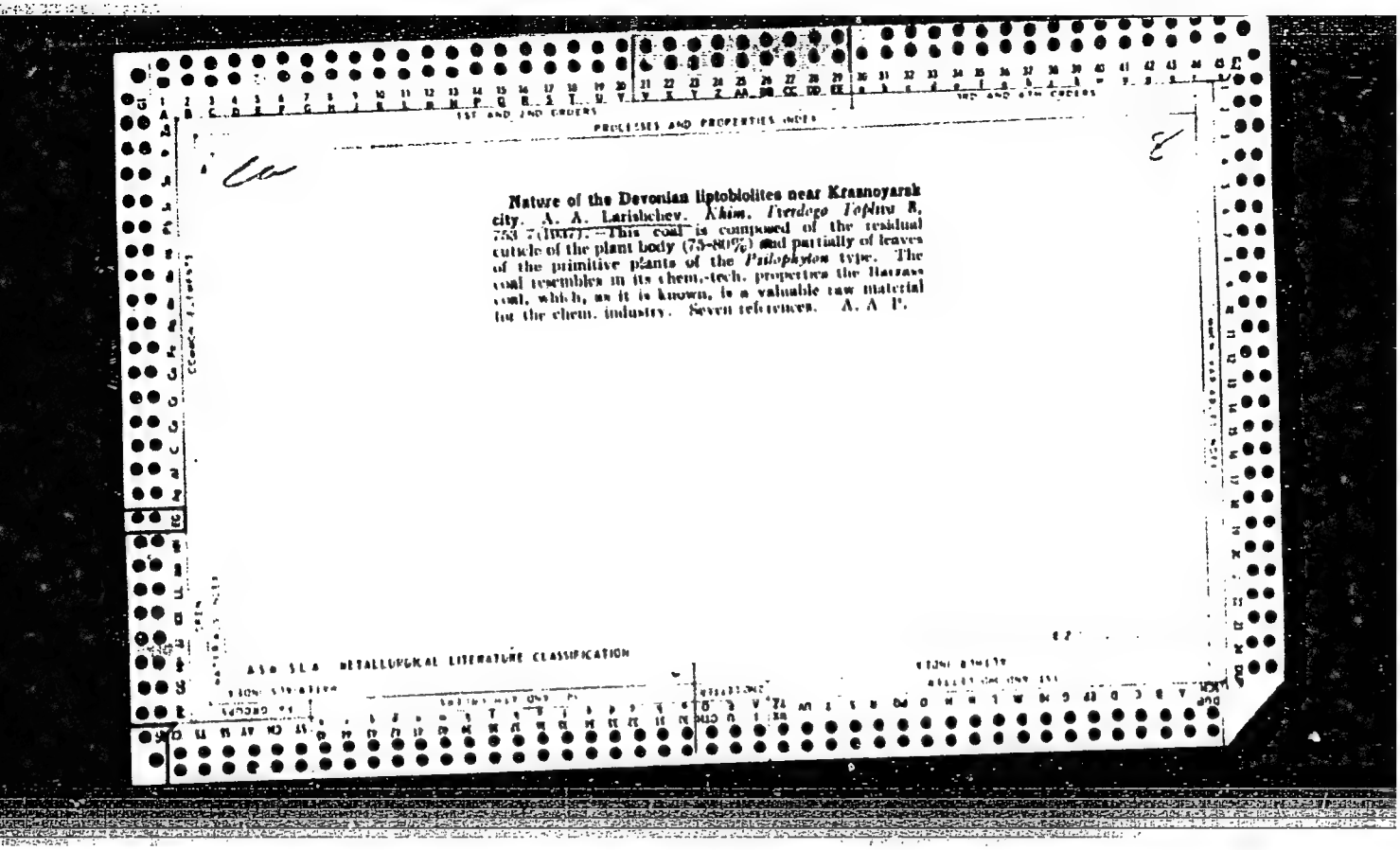
LARISH, E. (Bukharest)

Equations of free molecular flow around a body. Izv.AN SSSR.Otd.tekh. nauk.Mekh.i mashinostr. no.2:70-77 Mr-Ap '61. (MIRA 14:4)
(Aerodynamics)

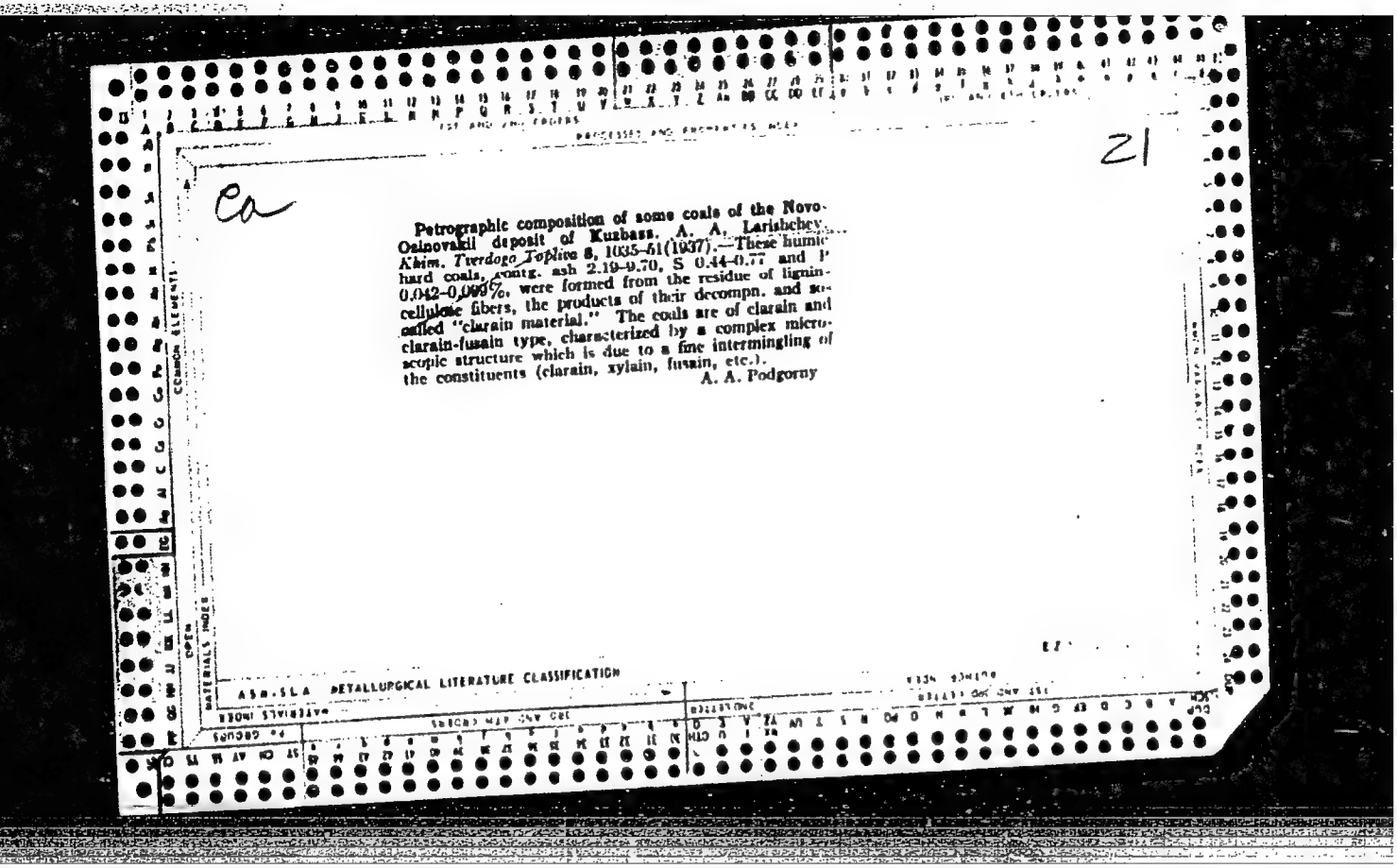


Formation of the Tertiary coal in the region of the lower layer Ob'. A. A. Larichchev. *Izvest. Tomskogo Politekh. in-ta*, 8, 201-7(1937). The investigated coal of the lower layer of the vein is a typical humic coal, or part an autochthonous brown coal of an av. degree of carbonization, which is transformed into an allochthonous lignite coal in the higher layers. It is probably a Miocene coal. Microscopic examn. disclosed the presence of remains of *Taxaceae*, *Abietineae*, *Angiospermae*, some diatoms and *Chlorophyceae*. The investigated coal has no great industrial value.
A. A. Pelzman

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



Nature of the Devonian liptobiolites near Krasnoyarsk city. A. A. Larishchev. *Khim. Tverdego Topliva* **8**, 753-7 (1937).—This coal is composed of the residual cuticle of the plant body (75-80%) and partially of leaves of the primitive plants of the *Psilophyton* type. The coal resembles in its chem.-tech. properties the Barzass coal, which, as it is known, is a valuable raw material for the chem. industry. Seven references. A. A. P.



21

Ca

Petrographic composition of some coals of the Novo-Osinovskii deposit of Kuzbass. A. A. Larishchev. *Khim. Tverdogo Topliva* 8, 1035-51(1937).—These humic hard coals, contg. ash 2.19-9.70, S 0.44-0.77 and P 0.042-0.099%, were formed from the residue of lignin-cellulose fibers, the products of their decompn. and so-called "clarain material." The coals are of clarain and clarain-fusain type, characterized by a complex micro-scopic structure which is due to a fine intermingling of the constituents (clarain, xylain, fusain, etc.).

A. A. Podgorny

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LARISHCHEV, A. A.

Larishchev, A. A. "On the natural state of coal of the Barzas type, Uchen. zapiski (Tomskiy gos. un-t im. Kuybysheva), No. 11, 1948, p. 79-100, - Bibliog: 48 items.

So: U-3261, 10 April 53, (Letopis 'Zhurnal Statey, No. 12, 1949).

LARISHCHEV, A.A.

Larishchev, A. A. "The microflora of the Devonian limestone on Barrow's Island", Uchen. zapiski (Tomskiy gos. un-t im. Kuybysheva), No. 11, 1948, p. 101-07, - Bibliog: 5 items.

So: U-3261, 10 April 53, (Letopis 'Zhurnal 'nykh Statey, No. 12, 1949).

LARISHCHEV, A. A.

Larishchev, A. A. and Khakhlov, V. A. "On the history of the investigation of the quality of the coal of the To'Usa area of the Kuzbas" (On the problem of coking value), Uchen. zapiski (Tomskiy gos. un-t im. Kuybysheva), No. 11, 1948, p. 167-71.

So: U-3261, 10 April 53, (Letopis 'Zhurnal 'nykh Statey, No. 12, 1949).

PA 33/49T63

LARISHCHEV, A. A.

Oct 48

USSR/Geology
Shale, Bituminous
Coal

"Possible Domanite Deposits on the Eastern Slopes of the Northern Urals," A. A. Larishchev, 4 pp

"Dok Ak Nauk SSSR" Vol LXII, No 4

Discussion of a deposit of Devonian psilophite "liptobiolith" discovered by the geologist I. I. Skalaban in 1940. Deposit is a layer of bituminous shale 15 meters wide in a pit about 2 meters from the surface among black bituminous limestones of the Devonian in the Kal'ya River, right tributary of the Yuzhnaya Sos'va, 5 km from its mouth. Submitted by Acad V. A. Obruchev, 20 Jul 48.

33/49T63

1. LARISHCHEV, A.A.

2. USSR (600)

4. Algae, Fossil

7. New fossil blue-green algae of the Jurassic period, Bot.mat.Otd.spor.rast. 8, 1952.

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953. Unclassified.

LARISHCHEV, A. A.

"The Floristic Composition of the Mesozoic Forests of the Gobi Desert in Mongolia"

A paper presented on 1 April, The Activity of the Moscow Society of Naturalists, Byulleten' Moskovskogo Obshchestva Ispytateley Prirody Vol LX

No 6, Moscow, Nov-Dec 1955, pp 80-90, Geology Section
Source: U-9235, 29 Nov 1956

LARISHCHEV, A.A.

Botanical composition of Mesozoic forest in the Gobi Desert (based on data of the Paleontological Expedition of the Academy of Sciences of the U.S.S.R.during 1946-1949). Biul.MOIP.Otd.geol.30 no.6:97-98 N-D '55. (Gobi--Trees, Fossil)
(MLRA 9:4)

LARISHCHEV, A.A.; KURBATOVA, A.A.

Methods of studying accessory minerals among terrigenous mineral mixtures of coal. Trudy Lab.geol.ugl. no.6:202-212 '56. (MLRA 10:2)

1. Tomskiy Gosudarstvennyy universitet.
(Coal--Analysis) (Coal geology)

LARISHCHEV, A.A.

Fossil remains of wood from the mottled clays of Amangeldy District, Turgai Depression. Dokl.AN SSSR 107 no.1:139-140 Mr '56.(MLRA 9:7)

1.Tomskiy gosudarstvennyy universitet imeni V.V.Kuybysheva.
Predstavleno akademikom V.N.Sukachevym.
(Amangeldy District--Trees, Fossil)

LARISHCHEV, A.A.

15-1957-7-8922

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 7, p 5 (USSR)

AUTHOR: Larishchev, A. A., Rodygin, A. E.

TITLE: Some Examples of the Use of a Relief Topogeopolygon in Teaching Geological Mapping and Structural Geology. (Nekotoryye primery ispol'zovaniya rel' yefnogo topogeopoligona v prepodovanii geologicheskogo kartirovaniya i strukturnoy geologiyi)

PERIODICAL: Tr. Tomskogo un-ta, 1956, Nr 135, pp 82-92

ABSTRACT: The use of the relief topogeppolygon in teaching allows us to introduce the student to the basic methodology of geological mapping in the field. As an example the authors present one of the problems which can be solved by using a relief topogeopolygon. Numbers designating outcrops are written upon a topogeopolygon and for each number a student is given a specially selected collection of rock samples and paleontological remains, and data on the elements of deposition,

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15-1957-7-8922

Some Examples of the Use of a Relief Topogeopolygon in Teaching Geological Mapping and Structural Geology. (Cont.)

the stratigraphical sequence, the thickness of separate strata, etc. The final aim of this problem is to construct a geological map upon the topographical base of a given topogeopolygon, and also to produce a complete description of the geological structure and the history of the geological development of the region.

Card 2/2 A. L. Knipper

15-1957-10-13680

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 10, p 37 (USSR)

AUTHOR: Larishchev, A. A.

TITLE: Some Rare Fungi Remains From Tertiary Rocks (A Study in Paleomycology) /O nekotorykh redkikh ostatkakh gribov iz tretichnykh otlozheniy (Paleomikolog. etyud)/

PERIODICAL: Tr. Tomskogo un-ta, 1956, vol 135, pp 136-142

ABSTRACT: Because it has a five-celled ascospore, a distinctively abjointed and fringed mycelium, and a fruit body of radiating prosenchyma (Thyriothecium), Edwards referred the fungus he found in 1922 to Phragmothyrites eocaenica. The author, after examining the descriptions in the literature as well as studying similar fossils of fungi from Western Siberia, came to the following conclusions. The placing of all the remains enumerated by Edwards into the single species of Phragmothyrites eocaenica must be considered an error. The assignment of the large fruit bodies of radiating prosenchyma

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15-1957-10-13680

Some Rare Fungi Remains From Tertiary Rocks (A Study in Paleomycology)

(perithecium) with diameters from 120 to 160 microns should be changed to Microthyrites podocarpites (Edwards) Lar. Besides the Eocene of the Isle of Mull in Scotland, the locality where Edwards first described the mycelia, these forms are known chiefly from the upper Oligocene and lower Miocene of Germany and Western Siberia. The small distinctively abjointed and fringed bodies, which should still be called Phragmothyrites eocaenica (Edwards), belong to the remains of fossil fungi whose systematic position has not yet been determined. Up to now, all known remains of this kind have been found in Eocene deposits in Scotland, the United States of America, Germany, and Western Siberia. The paper includes one table.

Card 2/2

R. A. Vasina

LARISHCHEV, A.A.

Critical remarks on Konrad Benes' article "Paleomycology is a new trend in microscopic studies of coal." Izv. AN SSSR. Ser.geol. 26 no.8:110-112 Ag '61. (MIRA 14:9)
(Coal--Analysis)

BUDNIKOV, V.I.; LARISHCHEV, A.A.

New find of Devonian liptobioliths in the Kuznetsk Basin in connection with the problem of Paleozoic oil in Siberia. Trudy SNIGGIMS no.14:74-79 '61. (MIRA 15:8)
(Kuznetsk Basin--Coal geology) (Siberia--Petroleum geology)

LARISHCHEV, A.A.

Suberin nature of some Jurassic coals in the Kuznetsk Basin and their classification. Izv. vys. ucheb. zav.; geol. i razv. 6 no.2:84-93 F '63. (MIRA 16:6)

1. Tomskiy gosudarstvennyy universitet im. V.V. Kuybysheva.
(Kuznetsk Basin—Coal—Classification)

LARISHCHEV, A.A.

Petrographic composition of some coals of the U.S.S.R. Sov. geol. 8 no.3:100-106 '65. (MIRA 18:5)

1. Tomskiy gosudarstvennyy universitet.

LARIYONOV, L. F.; DEGTEVA, S. A.; LESNAYA, N. A.

Experimental data on an antineoplastic preparation phenestrin. Vop. onk. 8 no.4:12-14 '62. (MIRA 15:4)

1. Iz laboratorii eksperimental'noy khimioterapii Instituta eksperimental'noy i klinicheskoy onkologii AMN SSSR (dir. - deystv. chl. AMN SSSR, prof. N. N. Blokhin). Adres avtorov: Moskva, D-364, Volokolamskoye shosse, 30, Institut eksperimental'noy i klinicheskoy onkologii.

(CHOLESTEROL) (ACETIC ACID) (CYTOTOXIC DRUGS)

MARKIN, A.

The initiative of efficient workers in falling. Sov. profsoiuzy 4 no.9:40-41 S '56. (MLRA 9:10)

1. Slesar' mekhanicheskikh masterskikh Surskoy sukonnoy favriki, Penzenskoy oblasti.

(Penza Province--Efficiency, Industrial)

LAR'KIN, A.

Auditor's notes. Fin.SSSR 37 no.2:65-66 F '63. (MIRA 16:2)
(Volgograd Province—State farms—Auditing and inspection)

LARKIN, A. I., AND A. T. [illegible]

"The Antigenic Complexes of Bacteria, First Communication: Comparative Data on the Antigenic and Serological Properties of Boivan's Antigen and the Protein-Polysaccharide Complex
ZhMEI, 6, 2-126, 1947

21(7)

AUTHORS: Vedenov, A. A., Larkin, A. I. SOV/56-36-4-27/

TITLE: The State Equation of a Plasma (Uravneniye sostoyaniya plazmy)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 4, pp 1133-1142 (USSR)

ABSTRACT: A considerable number of papers has already dealt with the problem of the equation of state of a particle system with Coulomb interaction. A general formula for the virtual coefficients is not applicable in this case. The Coulomb forces are found to be remote action forces and therefore limitation by pair interactions is impossible already in the first term of an expansion in series of thermodynamic quantities according to the gas density n. By employing the method of the selfconsistent field Debye and Hückel (Ref 1) found the first term of an expansion of free energy according to the density n of the interacting particles, which is proportional $n^{3/2}$. Glauberman and Yukhnovskiy (Ref 2) endeavored to calculate the following terms, but, as they used an unsuitable method, they obtained incorrect results.

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The State Equation of a Plasma

SOV/56-36-4-27/70

For the purpose of calculating the first terms of the expansion according to n the authors of the present paper used a graphical method which is analogous to that used by Feynman in quantum electrodynamics. First, the diagram technique used is discussed for a system of interacting particles in thermodynamic equilibrium for close-range action forces. In the following the technique of summating graphs in the case of Coulomb interaction is discussed. For the free energy F of a completely ionized gas an expansion according to n is obtained in the form $F = F_{ideal} + An^{3/2} + Bn^2 \ln n + Cn^2$. The second term is identical with the Debye-Hückel term. Expressions are given for the coefficients of expansion. The authors finally thank L. D. Landau and V. M. Galitskiy for discussions. There are 5 figures and 4 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

Card 2/3

24 (3); 21 (7)
AUTHOR: Larkin, A. I.

SOV/56-37-1-39/64

TITLE: The Passage of Particles Through a Plasma (Prokhozhdeniye chastits cherez plazmu)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1(7), pp 264 - 272 (USSR)

ABSTRACT: The calculation of the slowing-down power of the plasma by the method of pairwise collisions leads to a logarithmic divergence. This divergence is connected with the remote action of the Coulomb forces. The screening effect of the medium can only be neglected if the distance between the particles is smaller than the Debye radius. For the calculation of the contribution of near collisions, the Coulomb field is cut off on the Debye radius. In the present paper, the slowing-down power is expressed by a correlation function which is a special case of the Green function for 2 particles. The latter function is calculated by the diagram method. By estimating the omitted graphs, the accuracy of the results found can be easily determined. At first, the transition probability is calculated. The author investigates a system of interacting particles being in thermal equilibrium. The Hamiltonians of the system and of the interaction

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between particle and medium are written down. The particle flying through the medium has the mass M and the velocity v. This particle flying through is regarded to be sufficiently fast ($e^2/\hbar v \ll 1$), so that its interaction with the particles of the medium can be investigated by the perturbation theory. The connection of the above-mentioned transition probability with the Green function for 2 particles is then investigated. The author is only interested in a two-particle function in which the coordinates and the times of the operators ψ and ψ^+ are in pairwise agreement. In the next part, the plasma vibrations are calculated. Finally, the slowing-down power of the plasma is calculated. The author investigates the case in which the particle moves at a velocity which is much higher than the mean thermal velocity of the electrons. The total losses of a fast particle in a plasma do not depend on temperature. The expression found for the total losses

$$-\frac{dE}{dt} = \frac{4\pi ne^4}{mv} \ln \frac{2Mm^{3/2}v^2}{\hbar(M+m)\sqrt{4\pi ne^2}}$$ holds for any velocity distribution of the electrons if the electrons can be regarded as

free, and if their mean velocity is much lower than the velocity of the particle flying through. The author thanks V. M. Galitskiy and A. B. Migdal for valuable advice. There are 1 figure and 5 Soviet references.

SUBMITTED: February 13, 1959

81675
S/056/60/038/06/11/012
B006/B056

24.2120

AUTHOR: Larkin, A. I.

TITLE: Thermodynamic Functions of a Low-temperature Plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 6, pp. 1896 - 1898

TEXT: It was the aim of the present paper to calculate the thermodynamic functions of a plasma consisting of electrons and ions at temperatures below ionization temperature. In the usual expression for the thermodynamic potential $-\beta\Omega = \sum_i \xi_i$, where $\beta = 1/kT$, summation is carried out over all kinds of particles. ξ_i is expressed by the chemical potential (2), and the Debye term $\varkappa^3/12\pi$, where $\varkappa^2 = 4\pi\beta\sum e_i^2 \xi_i$ is added to the thermodynamic potential. In summation, the author confines himself to such states in which the ionic dimensions are smaller than the spacings between the particles, and thus, the contribution of excited ions to the

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thermodynamic potential is proportional to $\xi^{3/2}$, and with respect to its order of magnitude equal to the contribution of the Debye term. First, the interaction between an ion with the charge Q_i and an electron is investigated, and the terms making a contribution are individually investigated. As a result, one finally obtains:

$$-\beta\Omega_{ie} = \xi_i \xi_e \left\{ \left(\frac{2\pi\hbar^2\beta}{m}\right)^{3/2} \sum_m \left[\exp(\beta E_m) - 1 - \beta E_m\right] + \frac{2\pi}{3}(\beta Q_i Q_e)^3 \cdot \left(\ln \frac{1}{3\beta Q_i Q_e \pi} - 2C + \frac{11}{6}\right)\right\},$$

where C is the Euler constant equaling 0.577. The contribution made by the interaction of ions with the charges Q_i and Q_j gives $-\beta\Omega_{ij} = -\frac{2\pi}{3}(\beta Q_i Q_j)^3 \left(\ln \frac{1}{3\beta Q_i Q_j \pi} - 2C + \frac{11}{6}\right)$. The expression obtained for the contribution made by the interaction between electrons and ions of one kind differs from the latter only by the factor 1/2. Finally,

Thermodynamic Functions of a Low-temperature Plasma

S/056/60/038/06/11/012
B006/B056

$$-\beta\Omega = \sum \xi_i + \frac{\pi^3}{12\pi} + \left(\frac{2\pi\hbar^2\beta}{m}\right)^{3/2} \xi_e \sum_i \xi_i \sum_m \left[\exp(\beta E_m) - 1 - \beta E_m\right] -$$

$$- \frac{\pi}{3}\beta^3 \sum_{i,j} (Q_i Q_j)^3 \xi_i \xi_j \left(\ln \frac{1}{3\beta Q_i Q_j \pi} - 2C + \frac{11}{6}\right) + \frac{\pi}{2}\beta^3 \left(\sum Q_i^4 \xi_i\right)\left(\sum Q_i^2 \xi_i\right)$$

is obtained. The last term of this equation is the Debye term. A. I. Vedenov is mentioned. There are 3 references: 1 Soviet, 1 German, and 1 British.

SUBMITTED: February 15, 1960

Card 3/3

VAKS, V.G.; LARKIN, A.I.

Using methods of the theory of superconductivity in problems pertaining to the masses of elementary particles. Zhur. eksp. i teor. fiz. 40 no.1:282-285 Ja '61. (MIRA 14:6)
(Superconductivity) (Praticles (Nuclear physics))

VAKS, V.G.; LARKIN, A.I.

Particle mass in the one-dimensional model with four-fermion interaction. Zhur. eksp. i teor. fiz. 40 no.5:1392-1398 My '61. (MIRA 14:7)

(Particles (Nucleas physics))
(Nuclear models)

26717
S/056/61/041/005/032/038
B102/B138

24.2140

AUTHORS: Vaks, V. G., Galitskiy, V. M., Larkin, A. I.

TITLE: Collective excitations in a superconductor

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 5(11), 1961, 1655 - 1668

TEXT: Quantum-field theory methods are applied to determine the spectrum of collective excitations in a superconductor. The collective excitations are investigated by means of the Green functions for zero temperatures. The excitations are treated as bound states of quasiparticles so that their spectrum can be determined from the pole of the two-particle Green function. The calculation of this function is based on the formal similarity of the problem to a one-dimensional relativistic one; The gap width plays the role of the mass and the proximity of the particle energy to that on the Fermi surface - that of the spatial momentum. For long-wave excitations the limiting frequencies and the dispersion of the oscillations are determined for any momentum l. First the relativistic formalism is developed for the theory of superconductivity using P. L. Gor'kov's

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Collective excitations in...

three types of Green functions (ZhETF, 34, 735, 1958). The real phase constant Δ is given by $\Delta = -i\int D(p-p')\frac{\Delta}{p'^2+\Delta^2}d^4p'$; $1 = -ig_0\int\frac{d^2p}{p^2+\Lambda^2}$; $g_0 = \varrho\int D(\vec{n}\vec{n}')d\vec{n}'/4\pi$, $D(p-p') = D(\vec{n}\vec{n}')$, $\vec{n} = \vec{p}/p$, $\vec{n}' = \vec{p}'/p'$; D is phonon Green function. The Bethe-Salpeter equation for the two-particle Green functions whose poles determine the excitation spectrum is written in weak coupling approximation.

$$K_{\mu\nu} = \frac{i}{2}\left[\left(G\left(p+\frac{k}{2}\right)\gamma_3\right)_{\mu\rho}\left(\gamma_3 G\left(p-\frac{k}{2}\right)\right)_{\sigma\nu} + \left(CG\left(-p+\frac{k}{2}\right)\gamma_3\right)_{\nu\rho}\left(\gamma_3 G\left(-p-\frac{k}{2}\right)\right)_{\sigma\mu}\right] \times \int d^4p'\,[D(p-p')K_{\rho\sigma}(p',k) - \tfrac{1}{2}D(k)\gamma^3_{\rho\sigma}\,\mathrm{Sp}\,\gamma^3 K(p',k)], \quad (25)$$

with

$$\gamma_3 = \begin{pmatrix} 0 & I \\ -I & 0 \end{pmatrix}, \quad \gamma_4 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \gamma_5 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}, \quad \gamma_1 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \quad C = \begin{pmatrix} \sigma_\mu & 0 \\ 0 & -\sigma_\mu \end{pmatrix} \quad (6)$$

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Collective excitations in...

is found which can be solved only for certain relations between the energies $k_0 = \omega$ and the momentum k of the excitation determining the spectrum $\omega(k)$. First the case k = 0 is treated. Here the general formulas

$$K^5_{lm} = \sum_{l_1} g_{l_1} \left[(L + \beta^2 f)_{ll_1m} K^5_{l_1m} + \frac{q_4}{2\Delta} f_{ll_1m} K^3_{l_1m} + \frac{1}{2\Delta} (q_3 f)_{ll_1m} K^4_{l_1m} \right] -$$

$$- 2\delta_{m0} \rho D(k) \frac{q_4}{2\Delta} f_{l00} K^3_{00},$$

$$K^3_{lm} = \sum_{l_1} g_{l_1} \left[\frac{q_4}{2\Delta} f_{ll_1m} K^5_{l_1m} - \left(f + \frac{q_3^2 - q_3^2 f}{q^2} \right)_{ll_1m} K^3_{l_1m} + q_4 \left(\frac{q_3 - q_3 f}{q^2} \right)_{ll_1m} K^4_{l_1m} \right] +$$

$$+ 2\delta_{m0} \rho D(k) \left(f + \frac{q_3^2 - q_3^2 f}{q^2} \right)_{l00} K^3_{00}, \qquad (30)$$

$$K^4_{lm} = \sum_{l_1} g_{l_1} \left[- \frac{1}{2\Delta} (q_3 f)_{ll_1m} K^5_{l_1m} - q_4 \left(\frac{q_3 - q_3 f}{q^2} \right)_{ll_1m} K^3_{l_1m} - \left(\frac{q_3^2 - q_3^2 f}{q^2} \right)_{ll_1m} K^4_{l_1m} \right] +$$

$$+ 2\delta_{m0} \rho D(k) q_4 \left(\frac{q_3 - q_3 f}{q^2} \right)_{l00} K^3_{00},$$

$$K^1_{lm} = \sum_{l_1} g_{l_1} (L - f + \beta^2 f)_{ll_1m} K^1_{l_1m}.$$

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with $q_3 = k n v, \quad q_4 = i\omega, \quad q^2 = q_3^2 + q_4^2, \quad \beta^2 = -q^2/4\Delta^2, \quad f(\beta) = \frac{\arcsin\beta}{\beta\sqrt{1-\beta^2}}$. (31)

change into

$$g_0 \frac{\omega^2}{4\Delta^2} f K_{00}^5 + \frac{i\omega}{2\Delta} f (g_0 - 2\rho D(\omega, 0)) K_{00}^3 = 0, \quad (32)$$

$$g_0 \frac{i\omega}{2\Delta} f K_{00}^5 - (1 + g_0 f - 2 f \rho D(\omega, 0)) K_{00}^3 = 0.$$

and for frequencies with $l \neq 0$ into

$$K_{lm}^5 = g_l \left(L + \frac{\omega^2}{4\Delta^2} f\right) K_{lm}^5 + g_l \frac{i\omega}{2\Delta} f K_{lm}^3, \quad (33).$$

$$K_{lm}^3 = g_l \frac{i\omega}{2\Delta} f K_{lm}^5 - g_l f K_{lm}^3 .$$

For $g_1^2 (g_2 - g_1)^{-1} \ll 1$ the value of ω approaches 2Δ and $f(\omega/2\Delta) \approx \frac{1}{2}\pi (1 - \omega^2/4\Delta^2)^{-\frac{1}{2}}$ from which $\omega_l^2(0) = 4\Delta^2(1-\alpha_l^2)$ follows $\alpha_l = \frac{1}{2}\pi g_1^2 (g_0 - g_1)^{-1}$. In the case of $l = 0$ (sonic oscillations)

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$$\frac{\pi\Delta}{2vk}\ln\frac{4\Delta^2}{4\Delta^2-\omega^2}-\left(\ln\frac{kv}{\Delta}-1\right)=0, \tag{40}$$

$$2\Delta-\omega=\Delta\exp\left(-\frac{2kv}{\pi\Delta}\ln\frac{kv}{\Delta e}\right). \tag{41}$$

is found for neutral particles. (30) changes into

$$K_{00}^{5}=(1+g_0\beta^2 f)_{00}K_{00}^{5}+\frac{i\omega}{2\Delta}f_{00}(g_0-2pD(k))K_{00}^{3}, \tag{42}$$

$$K_{00}^{3}=g_0\frac{i\omega}{2\Delta}f_{00}K_{00}^{5}+(2pD(k)-g_0)\left(f-\frac{(knv)^2(1-f)}{\omega^2-(knv)^2}\right)_{00}K_{00}^{3}.$$

which holds for an electron gas. For charged particles the dispersion of plasma oscillations is only weakly affected by superconductivity. For excitations with small k ($l \neq 0$, $kv \ll \alpha_1\Delta$) the system (30) can be solved as a system of independent equations. Since $\omega \approx 2\Delta$,

$$K_{lm}^{5}=g_l(L+f_{llm})K_{lm}^{5}+ig_l f_{llm}K_{lm}^{3},\quad K_{lm}^{3}=ig_l f_{llm}K_{lm}^{5}-g_l f_{llm}K_{lm}^{3} \tag{45}$$

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is found and $\omega_{lm}^2(k) = 4\Delta^2(1-\alpha_l^2) + \frac{1}{3}k^2v^2(1 + 2C^{lo}_{2o,\,lo}\,C^{lm}_{2o,lm})$, where C are Clebsch-Gordan coefficients. For large l, $\omega_{lm}^2(k) = \omega_l^2(0) + \frac{k^2v^2}{2}(1-m^2l^2)$ holds. For large k, instead of (30),

$$K_{10}^5 = g_1(L + f_{110})K_{10}^5 + if_{110}K_{10}^3, \quad K_{10}^3 = ig_1f_{110}K_{10}^5 - f_{110}K_{10}^3. \qquad (49)$$

is valid. The edge of the spectrum is defined by $\omega(k_{max}) = 2\Delta$ and $k_{max} = 3\alpha_1\Delta/v$. Near k_{max}

$$(4\Delta^2 - \omega^2)\ln\frac{4\Delta^2}{4\Delta^2-\omega^2} - \frac{v^2}{2}(k_{max}^2 - k^2) = 0. \qquad (52)$$

holds, from which it may be seen that $\omega = 2\Delta$ is a tangent to the curve $\omega(k)$. For every $m \neq 0$ there will be one excitation branch which is not terminated even for large k. Eq. (30) can be substituted by

$$K_{lm}^5 = g_lLK_{lm}^5 + \frac{2\pi\Delta}{kv}P_{lm}(0)\ln\frac{\tilde{kv}}{\sqrt{4\Delta^2-\omega^2}}\sum_{l_1}g_{l_1}P_{l_1m}(0)(K_{l_1m}^5 + iK_{l_1m}^3),$$

$$K_{lm}^3 = i\frac{2\pi\Delta}{kv}P_{lm}(0)\ln\frac{\tilde{kv}}{\sqrt{4\Delta^2-\omega^2}}\sum_{l_1}g_{l_1}P_{l_1m}(0)(K_{l_1m}^5 + iK_{l_1m}^3). \qquad (53)$$

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and

$$1 = \frac{4\Delta}{kv} \ln \frac{\widetilde{kv}}{\sqrt{4\Delta^2 - \omega^2}} \sum_l \alpha_l P_{lm}^2 (0), \tag{56}$$

$$4\Delta^2 - \omega^2 = \min\{k^2v^2, 4\Delta^2\} \cdot \exp\left[-\frac{kv}{2\Delta}\left(\sum_l \alpha_l P_{lm}^2 (0)\right)^{-1}\right]. \tag{57}$$

hold. For m = 0 and $\alpha_1\Delta \lesssim kv \ll \Delta$

$$K_{l0}^s = g_l L K_{l0}^s + \frac{2\pi\Delta}{kv} P_{l0}(0) \ln \frac{kv}{\sqrt{4\Delta^2 - \omega^2}} \left[\sum_{l_1} g_{l_1} P_{l_1 0}(0)(K_{l_1 0}^s + iK_{l_1 0}^3) - 2l\rho D\ (k)\ K_{00}^3\right],$$

$$K_{l0}^3 = \frac{2\pi\Delta}{kv} P_{l0}(0) \ln \frac{kv}{\sqrt{4\Delta^2 - \omega^2}} \left[\sum_{l_1} g_{l_1} P_{l_1 0}(0)\ (K_{l_1 0}^s + iK_{l_1 0}^3) - 2i\rho D(k)\, K_{00}^3\right]. \tag{59}$$

is found. In this case no solution exists with an ω near 2Δ. All branches of excitations with m = 0 and $l \neq 0$ for small k near 2Δ terminate at $kv \sim \alpha_1\Delta$. All results hold for an isotropic model of a metal. The authors thank A. B. Migdal, S. T. Belyayev and L. P. Gor'kov for discussions.

Collective excitations in...

There are 2 figures and 19 references: 11 Soviet and 8 non-Soviet. The four most recent references to English-language publications read as follows: A. Bardasis, J. R. Schrieffer. Phys. Rev., 121, 1050, 1961; P. Anderson. Phys. Rev., 112, 1900, 1959; P. Anderson, P. Morel. Phys. Rev. Lett., 5, 136, 1960; J. Bardeen et al. Phys. Rev. 108, 1175, 1957.

SUBMITTED: June 15, 1961

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B123/B104

24,2140 (1072, 1147, 1164)

AUTHORS: Gurevich, V. L., Larkin, A. I., and Firsov, Yu. A.

TITLE: Possibility of semiconductor superconductivity

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 185 - 190

TEXT: The authors discuss the possibility of a transition of a semiconductor into the superconducting state. Such a transition is found to be impossible in nonpolar semiconductors at a carrier concentration $n \ll 10^{19}$ since due to the low electron state density near the Fermi surface phonon attraction between the electrons is weaker than their Coulomb repulsion. Transition in polar, nonpiezoelectric semiconductors is possible only if the Fermi energy is much higher than the limit frequencies of the longitudinal optical vibrations. The authors obtained conditions for bringing about this transition which are the more favorable the more strongly the electron and lattice vibrations are coupled. These conditions are defined for InSb-type piezoelectric semiconductors with a nonpiezoelectric semiconductor being considered first. The results hold both for conduction electrons and donors, and for holes and acceptors.
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